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ABSTRACT

A literature review and two major studies discovered four approaches to job design, each geared toward different sets of outcomes for individual employees and organizations. The motivational approach tries to design jobs to provide the worker with autonomy and the opportunity to make decisions about how or in what order tasks are done. The mechanistic approach is based on the assumption that the work should be broken down into highly specialized jobs, tasks simplified, a minimum of idle time obtained, and repetition should be used to benefit from practice. The human factors approach designs the job to limit the amount of information to which the worker must pay attention or remember. The goal of the biological approach is to reduce the physical demands of work and the resulting discomforts and injuries. All of the approaches have advantages and drawbacks. Although each approach can help make a job better, all contain unintended consequences that advocates tend to ignore. For example, too liberal an application of the motivational approach can increase the mental demands of the job and increase training time and make it more difficult to find qualified employees. The mechanistic approach may lead to less interesting, satisfying, and rewarding jobs. The human factors approach may unintentionally decrease mental demands to the point of boredom. A drawback of the biological and human factors approaches is the financial cost. (Recommendations for further reading are made.) (YLB)

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NEW BUSINESSES

How Do You Design A Job?

Michael A. Campion and Paul W. Thayer

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How Do You Design A Job?

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Linda is a technical writer for a large company, writing reference and repair manuals on complex electronic equipment for computer maintenance personnel. At her annual performance review she received a marginal rating; satisfactory in most areas, but improvement needed. Her manager said that, although her performance was generally adequate, her manuals contained too many technical errors and the job seemed to be more than she could handle. Furthermore, he said her attitude was poor, she complained too much and was absent more often than others.

Linda was upset and thought her supervisor was unfair. She had told him about long delays in getting technical experts to correct her drafts. Even though she didn't understand many of the technical details she was writing about, no one would help her.

Is the problem Linda or is it her job? Linda has to write reference manuals that identify and describe hundreds of electronic equipment parts. She is a writer, not an electronics expert, but good writing is what the job requires. That means she must rely on information provided by engineers and others. If the information is incorrect or she misunderstands what she is told, there is no way for her to tell if she is wrong. The work provides little feedback on the quality of her efforts. A secretary knows when she makes a typing mistake and can correct it. An auto mechanic finds out if the engine is fixed by starting it. But Linda, however, must endure the never-ending process of reviews and revisions by technical experts, making it difficult to get a feeling of accomplishment.

Linda is viewed within her organization as support personnel, not part of the development and manufacturing team. Consequently, her opportunities for communication and positive social interaction are limited. She sees no variety in the job; all projects look alike to her. All these factors reduce Linda's job satisfaction and motivation.

The problems with her job don't end there. The job places great demands on her ability to attend to and remember many details. Although all projects look alike, the job is not specialized enough so that the technical details are ever the same. Even worse, she must use a complex word-processing system, leading to errors and frustration. Finally, after finishing a draft of a manual, she has to wait for reviews, and waiting results in boredom. These delays have an impact on her performance, but when she mentions them to her boss, he says she complains too much.

The physical environment of Linda's job is also poor. Her office lighting is bad and creates a constant glare on her computer screen. Her chair is uncomfortable and the keyboard too high. The office is noisy and either too hot or too cold.

Is this job made up? No, it's an actual job, although Linda is a composite of several people in that position.

Blame the Job or Blame the Worker

It's common to blame the worker when the real problem is poor job design. Many people believe that a job's design is fixed, dictated by the technology or the work to be done. Unfortunately, if performance is judged as being poor, the boss looks first to the worker, not the job. However, most job designs are not fixed. They can be changed, often with predictable consequences. The question is, how?

To answer this question, an exhaustive search of available literature on jobs was conducted, and specific rules on job design were extracted. There were rules for equipment, facilities, environments, job content and methods. These rules were then analyzed and sorted into distinct groups, based on the similarity of underlying theoretical orientation.

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The research discovered four approaches to job design, each geared toward different sets of outcomes for individual employees and organizations.

Two major studies also were conducted. One studied 121 jobs in the forest products industry, and the other looked at 92 jobs in the electronics field. All levels and types of jobs were included. The jobs were analyzed, and nearly 1,300 employees were interviewed or surveyed. Information on a broad spectrum of job areas was collected, including job satisfaction, absenteeism, training time, staffing difficulty, physical effort required, injury rates, error rates, job stress and mental demands. The research discovered four approaches to job design, each geared toward different sets of outcomes for individual employees and organizations.

The motivational approach

Advocates of the job-enrichment school of thought try to make a job motivational. Jobs should be designed to provide the worker with autonomy and the opportunity to make decisions about how or in what order tasks are done. The worker should get feedback on the quality of the work completed and be able to use a variety of skills and have opportunities for growth and learning. There also needs to be a chance to participate in work-related decisions and get recognition for a job well done. The possible additional benefits of the motivational approach are improved performance and lower absenteeism.

How would this approach help Linda? Recommendations might include:

- A variety of assignments, to increase the opportunity to learn new skills
- Technical training so Linda would know enough about electronics to monitor the quality of her work
- Formal assignation to the development team to increase communication, social interaction and feelings of accomplishment.

The mechanistic approach

The efficiency experts of the mechanistic approach advocate scientific study, perhaps with a stop watch and clipboard, to determine efficient work methods and techniques. This approach is based on the assumption that the work should be broken down into highly specialized jobs, tasks simplified, a minimum of idle time obtained and the use of repetition to benefit from practice.

The goals of this approach are increasing productivity, reducing errors and making a job as easy to perform as possible. The simpler the job, the less education and training are required and the easier it is to find people who can do it.

The mechanistic expert might recommend:

- Technical writers be assigned to limited types of reports. This reduces the technical information to be learned by each employee, and provides for the efficiencies of repetition.
- A faster means of providing technical information and reviews should be developed to reduce idle time.

The human factors approach

This approach to job design has gained public attention through the Three Mile Island nuclear power plant incident. That catastrophe was initially blamed on operator error, another case of blaming the worker. Subsequent investigations placed part of the blame on the complexity of the control-room operator's job. Hundreds of gauges and controls and poorly developed procedures placed excessive demands on the operator in an emergency situation. Governmental regulations issued after the incident dictated that nuclear power plant administrators must consider the human factors in design.

This approach tries to ensure that the attention and concentration required by a job do not exceed the ability of the least capable worker. The job is designed to limit the amount of information which the worker must pay attention to, think of or remember. In addition, perceptual demands of the work environment must be considered, such as appropriate lighting levels and user-friendly equipment. The goals of this approach are reducing mental stress and fatigue, training requirements and chances for error.

The human factors approach recommendations for Linda's job might include:

- Reducing the amount of detail to remember. Some form of job aid, such as a glossary of technical terms or a revision of a part's technical name that would enhance a writer's ability to remember them.
- Making the word processor more user-friendly, possibly through the improvement of instructional materials or simplifying programming systems.
- Improving the quality of lighting and reducing glare.

The biological approach

The goal of this approach is to reduce the physical demands of work and the resulting discomforts and injuries. Proponents are concerned with such overall physical requirements as strength and endurance needed to perform a job. Other concerns are with comfort features, including seating, climate, rest breaks and shifts. Biological recommendations for Linda's job might include:

Figure 1: Job Design Approach Checklist

The Mechanistic Job-Design Approach

- *Job specialization:* Is the job highly specialized in terms of purpose and/or activity?
- *Specialization of tools and procedures:* Are the tools, procedures, materials, etc. used on this job highly specialized in terms of purpose?
- *Task simplification:* Are the tasks simple and uncomplicated?
- *Single activities:* Does the job require the incumbent to do only one task at a time? Does it not require the incumbent to do multiple activities at one time or in very close succession?
- *Job simplification:* Does the job require relatively little skill and training time?
- *Repetition:* Does the job require performing the same activity or activities repeatedly?
- *Spare time:* Is there very little spare time between activities on this job?
- *Automation:* Are many of the activities of this job automated or assisted by automation?

The Motivational Job-Design Approach

- *Autonomy:* Does the job allow freedom, independence, or discretion in work scheduling, sequence, methods, procedures, quality control, or other decisions?
- *Intrinsic job feedback:* Do the work activities themselves provide direct, clear information about the effectiveness (in terms of quality and quantity) of job performance?
- *Extrinsic job feedback:* Do other people in the organization (such as managers and co-workers) provide information about the effectiveness (in terms of quality and quantity) of job performance?
- *Social interaction:* Does the job provide for positive social interaction (such as teamwork or coworker assistance)?
- *Task/goal clarity:* Are the job duties, requirements, and goals clear and specific?
- *Task identity:* Does the job require completion of a whole and identifiable piece of work? Does it give the incumbent a chance to do an entire piece of work from beginning to end?
- *Ability/skill-level requirements:* Does the job require a high level of knowledge, skills, and abilities?
- *Ability/skill variety:* Does the job require a variety of types of knowledge, skills and abilities?
- *Task significance:* Is the job significant and important compared with other jobs in the organization?
- *Growth/learning:* Does the job allow opportunities for learning and growth in competence and proficiency?
- *Promotion:* Are there opportunities for advancement to higher-level jobs?
- *Achievement:* Does the job provide for feelings of achievement and task accomplishment?
- *Participation:* Does the job allow participation in work-related decision making?
- *Communication:* Does the job provide access to relevant communication channels and information flows?
- *Pay adequacy:* Is the pay for this job adequate compared with the job requirements and pay for similar jobs?
- *Recognition:* Does the job provide acknowledgment and recognition from others?
- *Job security:* Do incumbents on this job have a high degree of job security?

The Biological Job-Design Approach

- *Strength:* Does the job require fairly little muscular strength?
- *Lifting:* Does the job require fairly little lifting, and/or is the lifting of very light weights?
- *Endurance:* Does the job require fairly little muscular endurance?
- *Seating:* Are the seating arrangements on the job adequate (with ample opportunities to sit, comfortable chairs, good postural support, etc.)?
- *Size differences:* Does the workplace allow for all size differences between people in terms of clearance, reach, eye height, leg room, etc.?
- *Wrist movement:* Does the job allow the wrists to remain straight, without excessive movement?
- *Noise:* Is the workplace free from excessive noise?
- *Climate:* Is the climate at the workplace comfortable in terms of temperature and humidity, and is it free of excessive dust and fumes?
- *Work breaks:* Is there adequate time for work breaks given the demands of the job?
- *Shift work:* Does the job not require shift work or excessive overtime?

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Figure 1: continued
The Perceptual/Motor Job-Design Approach

- ***Lighting:*** **Is the lighting in the workplace adequate and free from glare?**
- ***Displays:*** **Are the displays, gauges, meters, and computerized equipment used on this job easy to read and understand?**
- ***Programs:*** **Are the programs in the computerized equipment for this job easy to learn and use?**
- ***Other equipment:*** **Is the other equipment (all types) used on this job easy to learn and use?**
- ***Printed job materials:*** **Are the printed materials used on this job easy to read and interpret?**
- ***Workplace layout:*** **Is the workplace laid out so that the employee can see and hear well enough to perform the job?**
- ***Information input requirements:*** **Is the amount of attention needed to perform this job fairly minimal?**
- ***Information output requirements:*** **Is the amount of information that the employee must output on this job, in terms of both action and communication, fairly minimal?**
- ***Information processing requirements:*** **Is the amount of information that must be processed, in terms of thinking and problem solving, fairly minimal?**
- ***Memory requirements:*** **Is the amount of information that must be remembered on this job fairly minimal?**
- ***Stress:*** **Is there relatively little stress on this job?**
- ***Boredom:*** **Are the chances of boredom on this job fairly small?**

- Modifying or replacing her chair so that she had adequate postural support
- Lowering the keyboard to reduce stress caused by bending her wrists
- Eliminating the source of the noise or installing sound absorbing materials in the work area
- Maintaining comfortable temperatures at all times.

All Approaches Have Advantages and Drawbacks

Although each of these approaches to job design can help make Linda's job better, all contain unintended consequences that advocates tend to ignore. Some of them are:

- Too liberal an application of the motivational approach can increase the mental demands of a job, therefore increasing training time and making it more difficult to find qualified employees. The stimulating nature of highly motivational jobs can lead to stress and burnout also.
- The mechanistic approach does a good job of cutting training time and expense, but it may lead to jobs that are less interesting, satisfying and rewarding.
- The human factors approach may unintentionally decrease mental demands to the point that boredom and monotony become major concerns.
- A drawback of the biological approach, and to some extent the human factors approach, is the financial cost of changing equipment or work environments.

It's easy to stress one approach over the others when designing or redesigning jobs, but it's done at considerable risk. Research shows that job design involves trade-offs between these approaches.■

For further reading, we recommend:

The technical details of this study are published in "Development and Field Evaluation of an Interdisciplinary Measure of Job Design" by Michael A. Campion and Paul W. Thayer (*Journal of Applied Psychology*, February 1985). Other published work on job design by the first author includes "Biomechanics and the Design of Industrial Jobs" by Michael A. Campion and Eileen J. Phelan (*Personnel Journal*, December 1981).

A great number of literature references were drawn upon in the design of this study, and they were taken from a variety of different academic disciplines. In fact, there are literally hundreds of written works on the broad topic of job design in each of the relevant disciplines. Therefore, we will provide only citations to the more contemporary writings and to books that summarize the literature. For the interested reader, the books listed will contain references to the classic works and to the research articles in each of the areas.

A good contemporary book on the mechanistic approach to job design is *Motion and Time Study: Design and Measurement of Work* by Ralph M. Barnes (John Wiley & Sons, 1980). Another good description of the

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Figure 2: Summary of Outcomes From the Job-Design Approaches

Job-Design Approach	Positive Outcomes	Negative Outcomes
Mechanistic	Decreased training time Higher utilization levels Lower likelihood of error Less chance of mental overload and stress	Lower job satisfaction Lower motivation Higher absenteeism
Motivational	Higher job satisfaction Higher motivation Greater job involvement Higher job performance Lower absenteeism	Increased training time Lower utilization levels Greater likelihood of error Greater chance of mental overload and stress
Biological	Less physical effort Less physical fatigue Fewer health complaints Fewer medical incidents Lower absenteeism Higher job satisfaction	Higher financial costs because of changes in equipment or job environment
Perceptual/motor	Lower likelihood of error Lower likelihood of accidents Less chance of mental overload and stress Lower training time Higher utilization levels	Lower job satisfaction Lower motivation

It's easy to stress one approach over the others when designing or redesigning jobs, but it's done at considerable risk. Research shows that job design involves trade-offs between these approaches.

mechanistic approach that also addresses the biological features of job design is *Work Design* by Stephan Konz (Grid, 1979).

The most widely recognized version of the motivational approach is found in *Work Redesign* by J. Richard Hackman and Greg R. Oldham (Addison-Wesley, 1980). An excellent document that addresses the motivational approach from a broader perspective is *Task Design: An Integrative Approach* by Ricky W. Griffin (Scott-Foresman, 1982).

A well-known book on the biological approach is *Fitting the Task to the Man: An Ergonomic Approach* by Etienne Grandjean (Taylor & Francis, 1980). Grandjean also treats the perceptual/motor approach to job design. Another good book on the biological approach that focuses mainly on the biomechanical aspects is *The Biomechanical Basis of Ergonomics: Anatomy Applied to the Design of Work Situations* by E. R. Tichauer (John Wiley & Sons, 1978).

An excellent reference source on the perceptual/motor approach, *Human Engineering Guide to Equipment Design,* was written by a variety of authors and edited by Harold P. Van Cott and Robert G. Kinkade (U.S. Government Printing Office, 1972). Another well-recognized book on the topic is *Human Factors in Engineering and Design* by Ernest J. McCormick (McGraw-Hill, 1972).

Finally, *Design of Jobs,* edited by Louis E. Davis and James C. Taylor (Goodyear, 1979), is a novel book that includes the unusual combination of articles on both the mechanistic and motivational approaches and that provides a historical perspective on job design.

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